



Answer all questions

Question one

1- Define the following terms:

- Endogenous System
- Exogenous System
- Closed System
- Open System

2- Differentiate between the following:

- Continuous System and Discrete Systems
- Stochastic model and Deterministic model
- Static model and Dynamic model

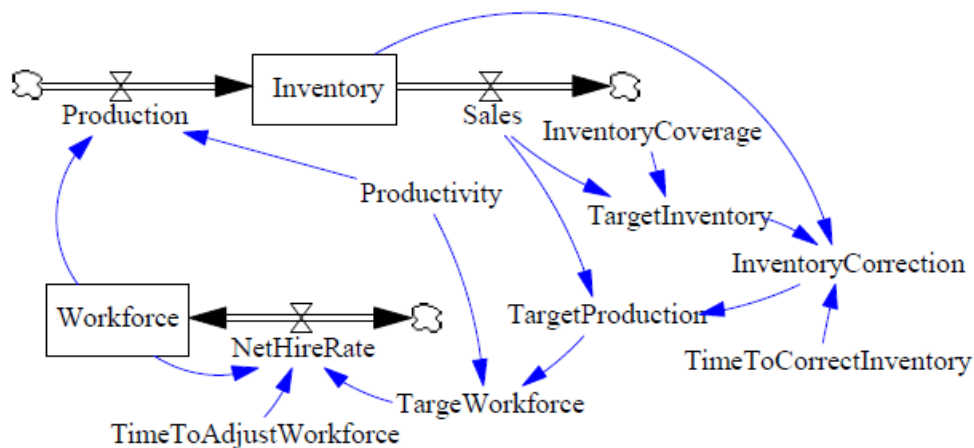
3- Build a simple model of a system with 1st or 2nd order positive and/or negative feedback loop (e.g. population system, bank account system, production-inventory control (Try with only one system))

4- What are the types of simulation

Question Two

1- For the following model

- What are the stocks, flows, constants and auxiliary variables
- Draw the causal loop diagram
- Give three feedback loops in the model



2- Give four pattern of behavior for Systems?

3- Explain the required Characteristics for modeling Queuing Systems

Question Three

1- Explain the element for the following notation, (M / M / 1 / ∞ / ∞)

2- The stock supervisor of a large government department described the procedures carried out by his staff as follows:

“Customers (that is other sections within our department) can order items by completing a standard 3-part, multi-line customer demand form. When the customer demand form is received by Sue, she checks to ensure the form has been completed correctly. She then sequentially registers the customer demand on the demand register sheet as well as filling in details such as customer number and date received, on the sheet. Sue then fills out a demand receipt slip, which includes the demand registration number and date received, and returns the slip to the customer. The original copy of the customer demand is filed in the customer demand file.

The other 2 copies, or the customer demand set as they are called, are put into Sue’s out tray awaiting collection by Bill, the warehouse clerk, three times a day. For each item on a customer demand, Bill searches the stock cards to see if stocks exist in the warehouse to satisfy the demand line. He fills out the amount available for despatch column on the demand line with the amount available from stock. Bill creates a back order for any outstanding quantities and files these back orders awaiting receipt of a delivery from the manufacturer. Bill adjusts the balances on the stock cards by the amount noted for dispatch. Also, he adds the remaining quantity demanded, if any, to the due out column on the stock card. Each time the stock records are changed, the new stock item balance is compared to the reorder level on the stock card. If the item stock balance is below this level, a manufacturer’s order form is filled in and sent to the manufacturer.

Bill sends the customer demand set with completed dispatch amounts to the delivery staff, who select, pack and deliver the goods to the customer. The customer signs the delivery copies of the customer demand set and retains the first copy for their records. The second signed copy is returned to Sue who matches the delivery copy with the original customer demand.”

- Draw a logical data flow diagram (DFD) of the procedures described above.
- Write structured English to describe the ‘Confirm Stock Availability’ process performed by Bill in the warehouse.
- Draw an entity-relationship (E-R) diagram for the entities described in the narrative above.

Question Four

1- Based on the following description, draw an *ER diagram* of a walk-in clinic information system that will keep track of patients, doctors, appointments and medications. A patient comes to the doctor by appointment. Each patient has a unique number, name, address, date of birth, date and time of appointments with doctors. A patient may receive medications, which are assigned by a doctor. Each medication is described by unique number, name, and manufacturer name. Each doctor is characterized by employee id number, name, phone, and specialization.

- Identifying all the Entities
- Drawing an ERD for the system showing all relationships

2-A bank uses the following rules to classify new accounts. If depositor's age is 21 or above and if the deposit is Rs 100 or more, classify the account type as A If the depositor is under 21 and the deposit is Rs 100 or more, classify it as type B If the depositor is 21 or over and deposit is below Rs 100 classify it as C If the depositor is under 21 and deposit is below Rs 100 do-not open account

- For the above case study perform the process modeling by:
 - Decision tree
 - Decision table
 - structured English